Revised: July 29, 2014

GSP 21

A. General Description

This procedure governs the sampling procedures for contractor acceptance testing of hot mix asphaltic concrete.

The sampling testing, and inspection duties described herein are to be performed by a Georgia Department of Transportation Certified Contractor QCT.

1. Sampling

a. Randomly select samples from within Sublots of 500 tons (or 500 Mg) per mix type. Use the same procedure in situations where more than one mix is produced or mix is produced for different projects within the same working day.

b. An Acceptance Lot consists of the amount of each type of asphaltic concrete mixture produced and placed in one construction day or at least 500 tons (or 500 Mg). If less than 500 tons (or 500 Mg) is produced per mixture type, it may be incorporated into the next day's production for Lot determination. In this case, use the same mix-sampling schedule as if the mix had been produced all in one operation. Prior to mix production, the Contractor may request to separate and maintain Lots of the same mix type when producing and placing mix in separate operations such as one Lot for mainline and another for shoulder mix under guardrail. Lots will not be separated after the production and placement of mix; this request must be submitted prior to mix production. The State Materials Engineer may waive this requirement under extenuating circumstances.

c. Sublots may be increased to 750 tons (or 750 Mg) if approved by both the District Testing Management Operations Supervisor and the Area Bituminous Technical Services Engineer. To be considered for use of expanded sublots, the contractor must have produced at least 2000 tons (or 2000 Mg) per day for three consecutive working days. Approval for increased sublot sizes may be rescinded upon agreement by both the District Testing Management Operations Supervisor and the Area Bituminous Technical Services Engineer any time the contractor fails to produce at least 2000 tons (or 2000 Mg) for any of the three days within a consecutive three day work period.

d. A Lot containing less than 500 tons may be closed when a pay reduction is imminent due to Quality Acceptance Sample test results when approved by the District Testing Management Operations Supervisor and the Area Bituminous Technical Services Engineer.

e. Sample the mix from the truck or roadway and quarter it according to GSP 15. The appropriate sample size required is prescribed in GDT 83 or GDT 125. When roadway cores are to be obtained or required for mix acceptance samples, take these cores according to GDT 73. The coring operation will be supervised by a GDOT representative.

f. If the size of both the opposite quarters obtained fails to meet specified size requirements, the next available truck should be sampled, with care taken to obtain a sample that meets the minimum size required for both opposite quarters. It should be documented in the plant diary as to why the random load was not sampled. During the quartering process of Hot Mix samples, the opposite quarters from the acceptance test specimen shall be labeled by the QCT and retained for Department comparison testing. In addition, label the remaining material removed from the total sample and retain it for possible Referee testing by the Department. A copy of the completed TM 140 or TM159-5 shall be placed with the sample.

References: GSP 15 **(Sampling Procedures For Asphalt Concrete Mixtures)**

GDT 73 **(Method of Random Selection And Acceptance Testing of Asphaltic Concrete).**

DOT 163 (Asphaltic Concrete Plant Sampling Report).

Sampling Report and Random Number Selection Examples.

Subsection 400.3.06

Note 1: All asphaltic concrete hot mix samples obtained by QCT's for Comparison and Referee testing shall be placed in a hot melt box (hot or cooled), or samples may be placed in a cloth or plastic bag after material has cooled. These sampling methods will help to eliminate the loss of liquid Asphalt Cement. (Do not use metal cans or place hot material in cloth or plastic bags when sampling asphaltic concrete mixes.)

Note 2: OGFC and PEM Acceptance Samples are obtained using preheated scoops in accordance with GSP 15. An additional sample shall be obtained and retained as the Opposite Quarter. For PEM, OGFC and thin lift courses < 110 lbs/yd^2, the retained opposite quarter shall be used for reevaluation when a reevaluation is requested by the Contractor.

Note 3: It will be the responsibility of the QCT Manager or QCT Technician to inform the Testing Management Operations Supervisor and Technical Service Engineer 24 hours prior to starting production if plant operations have been discontinued for more than seven calendar days.

2. Mixture Temperature

a. Take the mix temperature when extractions are obtained and also at other times as necessary to maintain uniform and specification temperatures. If problems exist, take one per load until problem has been corrected. Take the temperature on OGFC and PEM mixes at a frequency of at least one per hour.

b. The QCT shall take the temperature of the mixture and record the results on the load ticket each time a sample is taken. The respective load tickets shall also be signed by the QCT for each load from which a sample or temperature check is taken.

c. Perform asphalt thermometer calibration at least once per week or at increased intervals as necessary to assure accuracy. Document calibrations in the plant diary.

Temperature Tolerance = ± 20 °F (± 11 °C) of the Job Mix Formula (JMF).

Reference: Subsection 400.2.01.A

3. Stripping Tests

Stripping tests will only be required on Open Graded Friction Course (OGFC) and Porous European Mix (PEM) for every sample obtained.

Reference: GDT 56 (Test Method For Heat Stable Anti-Strip Additive)

4. Extractions

a. Determine the liquid asphalt content either by the extraction or ignition method. Sieve the remaining aggregate to determine gradation.

b. Properly label the extracted aggregate, ensure that it is stored in an approved container and secured in a protected and enclosed environment. If samples meet a 1.00 pay factor and are not procured by the Department within three state funded production days, they may be discarded. If there is less than a 1.00 pay factor, the sample must be saved for seven state funded production days before being discarded.

c. Perform these procedures at the prescribed frequency in accordance with GDT 83 or GDT 125, GDT 38 and Subsection 400.3.06 of the Contract. Complete acceptance test results on the same day samples are obtained and entered on the extraction worksheet and the DOT Form 159-5. Enter results for projects not requiring compactions into the Plant Computer and up-load daily to the DOT data collection system. Enter results for projects that require compaction tests into the plant computer and up-load the day the compaction test results are received. If compaction test results are not received within 2 days, notify the Testing Management Operations Supervisor. In the event the DOT data collection system is unavailable or error messages are given, FAX a printout of the results to the Testing Management Operations Supervisor within one working day.

Note 4: Any test out of Section 828 must be reported to TMOS and Bituminous TSE immediately and properly documented.

Note 5: When determining the AC content by ignition (GDT 125) the long burn ticket shall be attached to the Random Number Sheet and submitted to the branch laboratory, no copies or short tickets will be accepted.

References: GDT 38 **(Method of Test for Mechanical Analysis of Extracted Aggregate)**

GDT 83 **(Method of Test for Extraction of Bitumen from Paving Mixtures using the Vacuum Extractor)**

GDT 125 **(Method of Test for Determining AC Content by Ignition)**

Subsection 400.3.06.A.3.b.3

OMR-TM-140 (Extraction Analysis Worksheet)

DOT 159-5 (Asphaltic Concrete Lot Report)

Extraction Worksheet Example

Extraction Analysis Sieve Sizes for Each Mix

Asphalt Extraction Handout

5. Lot Tonnage

Enter all information requested on the Daily Production Status Sheet on a daily basis. Give the completed sheet to the TMOS no later than two working days after the end of the respective month.

Reference: Daily Production Status Sheet.

6. Haul Vehicle Inspection

Inspect haul vehicles prior to loading for proper tarps, strapping, insulation, and holes for taking temperature. Inspect vehicle beds for evidence of diesel fuel, or un-approved releasing agent, loose, foreign material and asphalt build-up. When any of these items are found to be in noncompliance with the specifications, make corrections before haul vehicle is allowed to transport material.

References: Subsection 400.2.01.A.

7. Lime Checks

a. Make lime checks daily, during mixture production regardless of tonnage, according to lime check procedures posted at each plant for type of system. Record the calculations and test results of these in the Plant Diary. Place the percent lime on DOT 159-5.

Tolerance: Daily plus or minus 10% of JMF requirement.

Semi-weekly (Volumetric System)- plus or minus 10% of weighed volume of lime compared to target weight of lime.

Semi-weekly (Weigh Pod System)- plus or minus 2% of weights.

b. Check weight systems by utilizing test weights at least twice per week (7 calendar days) or at increased intervals as needed to maintain accurate calibration. Record the results of these checks and the calculations in the plant diary.

c. Check volumetric systems by weight and record in diary at least twice per week.

d. Check lime interlock systems according to the posted procedure or once per month to insure plant operations will interrupt mixture production if hydrated lime introduction fails. Record the actual time it takes for systems to interrupt mixture production in the plant diary.

References: Subsection 400.3.02.6.c

8. Rap Requirements

a. Take an Abson Recovery Sample on all asphaltic concrete mixtures that contain ≥ 20% RAP. Take a sample at the beginning of construction for each affected mix type. Thereafter, use a sampling frequency of one sample per seven (7) lots for verification testing by DSR for viscosity of recovered AC. The Department may take Abson Recovery Samples on asphaltic concrete mixtures containing less than 20 % RAP for quality assurance purposes.

b. Samples may be taken at the same time extraction samples are taken from trucks. Take samples with a clean scoop, trowel, or spoon and deposit into a minimum 5 pound/maximum 10 pound (minimum 2.3 kg/maximum 4.6 kg) hot melt box. Properly close the box. Properly identify the samples and submit them along with the accompanying completed report to the appropriate DOT Lab.

References: Section 402

9. A.C. Samples

a. Take liquid asphalt samples and submit them to the Central or Branch Lab for testing.

b. Obtain samples from the AC storage tank sample valve after allowing approximately two (2) quarts to run off. Obtain samples in two (2) 1-pint (.5 liter), tin cans. If liquid overruns can, discard and obtain another sample.

c. Frequency

- **Start-up Samples** = When plant has been down for more than seven (7) calendar days, obtain results prior to plant operation beginning.
- **Quality Assurance AC Samples Interstate projects** = Two (2) per week (seven calendar days).
- **Quality Assurance AC Samples Non-Interstate projects** = One (1) per week (seven calendar days).

References: GSP 10 **(Sampling Procedure for Bituminous Material)**
DOT 170 (Sample Card for all Materials)
Sample of completed DOT 170

Note 6: Obtain Quality Assurance AC samples with a GDOT Representative present.

Notes 7: All contractors will be required to submit start-up samples to the Central or Branch Lab 24 hours prior to starting production. When production is scheduled to begin on a weekend, state holiday or the day after a state holiday, submit samples 3 to 4 days prior to start of production. Production will not be allowed to start until test results are complete and meet the specification requirements for liquid asphalt. The start-up sampling requirement can be waived by the State Bituminous Construction Engineer in extenuating circumstances on all grades of liquid asphalt cement except PG 76-22, if mix is produced for private work during this time and can be verified with bill of ladings (3 minimum) that the material is fresh and of the grade intended for a state project. If a failing AC sample is obtained, ensure that a representative of the Department is present when the follow-up sample is obtained.

10. Other Sampling Requirements

a. Provide all sample containers, extractants, forms, diaries and other supplies. These items are subject to the approval of the Engineer.

b. The following are materials that the Contractor's QCT will be required to sample and submit to the appropriate DOT laboratory, as directed. Samples should be submitted no later than seven (7) days from sample date should Department Technicians not assist with delivery:

   1) Sampling mix for LWT testing.
   2) Sampling mix for field verification of mix design.
   3) Sampling of miscellaneous materials used in the mix.

11. Warm Mix Asphaltic Concrete (WMAC) Projects Only

a. Sampling and fabrication requirements for WMAC for field verification of mix designs:

In addition to all standard sampling , testing and inspection requirements established in Section 410, Section 400, Section 402, Section 828 and other sections within this document, the additional following requirements are established:

1) Fabricate samples for testing in accordance with GDT 66 during the first day of WMAC production and then once every 5 days or 5 Lots thereafter unless otherwise instructed by the Office of Materials and Testing. These samples are to be fabricated during mixture production and not from reheated material. The fabricated samples are to be submitted to the District laboratory for testing along with completed sample cards.
2) Submit 2 additional samples taken from the same portion of mix as taken for the fabricated samples for GDT 66 for T-209 testing.
3) Obtain aggregate stockpile samples for all aggregate types used in the production of the WMAC and determine moisture content.
4) The Department may obtain cores samples on warm asphaltic concrete mixtures from the roadway for quality assurance purposes.

b. Documentation Requirements for WMAC Projects

1) Record aggregate moisture contents obtained for all sampled aggregate stockpiles in the plant diary.
2) Record, under Remarks on the 159-5, that WMAC is being produced.

12. Interstate Projects Only*

a. Sampling and fabrication of HMA specimens for field verification of mix designs for mixtures placed on interstate projects' mainline including leveling and patching meeting the specified lot frequency: Field verification of new mix designs will be required on interstate projects regardless of area of placement. The contractor will be required to fabricate and submit one set (two specimens) of mix design volumetric pills for mainline placement only.

   1) Submit Fifteen (15) filled ten pound (4.6 kg), minimum, hot melt boxes of mix ***(with each box having at a minimum, the mix ID and sample number of the test recorded with a marker on the box)*** to the Branch Laboratory for APA, T-209 and GDT 66 Testing from the same portion of mix as taken for asphalt cement content and gradation accompanied with the 159.5 for this sample. Provide one set of specimens for each mix type per Lot within the first two lots of production and one set per seven (7) lots, thereafter. The Office of Materials and Testing may reduce the field verification frequency, at the discretion of the State Bituminous Construction Engineer, based on prior field verification results.
   2) Fabricate and submit one set (two specimens) of mix design volumetric pills for Gap-graded and Dense-graded mixtures. Prepare the specimens using the gyratory compactor at the N Design Level Specified for the mixtures. Compact the mixtures at the Job Mix Formula temperature.

3. Conduct testing for AASHTO T-209 to determine the maximum specific gravity of the mixture by testing one sample for each specimen taken for gyratory compactor described above. Determine the mix density and percent air voids of each gyratory compactor specimen described above by using the average result of the two AASHTO T-209 samples as the theoretical maximum specific gravity.

4) Submit the opposite quarter of the acceptance sample used for asphalt cement content and gradation for Ignition Oven Calibration verification.

b. When mix problems constitute a Job Mix Formula adjustment, obtain approval for the changes from the Technical Services Engineer. Upon approval, fabricate one set (two specimens) for gyration at N design and two samples of mix for AASSHTO T-209, and submit an additional Fifteen (15) filled ten pound (4.6 kg) minimum hot melt boxes (or other approved container) of mix to the Branch Laboratory for other required testing with the set of gyrated samples. Submit these samples to the Branch Laboratory.

Note 8: Supply a gyratory compactor, including a calibration kit, electronic balance with a weighing capacity of 12,000 grams, asphalt ignition oven and all T-209 test equipment in the field laboratory as specified in Section 152 of the contract on all Interstate projects mainline paving only.

13. Non-Interstate Projects Only (No Gyratory Compactor Required)

a. Sampling and fabrication of HMA specimens for field verification of mix designs:

1) Sampling and fabrication of HMA specimens for field verification will only be required when a new Mix design is submitted or a Job Mix Formula change is requested.

2) For the first day of production or after a JMF change, submit material to the lab for verification of mix design.

3) Submit Fifteen (15) filled ten pound (4.6 kg), minimum, hot melt boxes of mix ***(with each box having at a minimum, the mix ID and sample number of the test recorded with a marker on the box)*** to the Branch Laboratory for fabrication of one set (two specimens) for gyration at N design, six specimens for LWT, one complete set of pills (six specimens) for GDT-66 and two samples for AASHTO T-209.

4) Submit the opposite quarter of the acceptance sample used for asphalt cement content and gradation accompanied with the 159.5 for this sample for Ignition Oven Calibration verification.

Note 9: For all plant produced mix design verifications obtain the mix from the same load as the acceptance sample. Record the sample tests results, mix ID number and JMF requirements on the back of the sample card. Samples must be within tolerance established in Section 828.

14. Plant Inspection Duties

Perform the inspection duties listed below at the designated frequency, document on the OMR-TM-143 form, and submit to the respective TMOS.

a) Visually observe cold feed bins and mechanical condition of each.

b) Visually inspect stockpiles for proper construction, segregation, and contamination.

c) Visually observe dryer, dust collection system, and bag house.

d) Visually observe asphalt storage system (unloading of tanker).

e) Visually inspect mixer on batch type plants and discharge gate on all type plants.

f) Visually inspect mix for segregation.

g) Visually inspect haul vehicles for proper covers, beds, and approved releasing agents.

h) Visually inspect lime systems.

i) Check A.C. and aggregate scales for accuracy and enter results in plant diary.

Reference: OMR-TM-143 (Asphalt Plant Check List)

15. Plant Diary

a. The plant diary is a legal document. Ensure that it remains at each plant and is properly filled out, daily. All entries are to be neat and legible.

b. Use preprinted Plant Diaries and include, as a minimum, the following information, to be entered on a daily basis.

Entries shall include, but are not limited to:

1) Project number or numbers
2) Date and weather conditions
3) Contractor's Representative (specify Q.C.)
4) Type of mix
5) Tons
6) Lot number
7) Mix I.D. number (from JMF)
8) CPW checks (Furnished by DOT personnel)
9) AC sample, Releasing Agent and Lime Samples including any samples taken for Lab testing
10) Thermometer calibration
11) Daily and Semi-weekly lime check calculations
12) Moisture content of aggregate stockpiles (when producing WMAC)
13) Any instructions given or received
14) Any DOT visitors
15) Any activities pertaining to State work.
16) Signature and title

16. Computer

Note 10: In the event the Contractor's computer system is inoperable, operations may be allowed to continue for a maximum of three working days by providing hand written test reports to the TMOS on a daily basis.

a. Enter all DOT 159-5 test data into the Plant Computer and upload daily to the DOT computer system as described in Section 4.c, above. Each plant must keep a copy of all acceptance tests in a file separated by Contract ID numbers and sub files for each Project listed per contract. Test data is to be backed up on electronic media, which shall remain at each plant site secured from dust or other environmental hazards. Keep a separate disk or CD for each project and ensure it becomes part of the project record. Place a copy of all completed 159-5's, work sheets, random number reports, and compaction results furnished by GDOT, in field lab project files daily for future reference. Ensure that all files are accessible to GDOT representatives at all times.

b. At each plant provide an internet service provider connection and an e-mail address for exchanging electronic correspondence with GDOT.

c. In accordance with SOP 27, provide an individual PC or laptop computer at each plant. Ensure that this computer remains at the plant at all times.

d. Ensure that each plant has a computer and accessories meeting the following requirements and as specified in Section 152 of the contract.

1) Minimum Requirements/Preferred:

For optimal performance, these are the recommended system requirements for installing and running the Field Data Collection System applications:

- Computer: IBM PC or compatible
- Software: Windows 98: Windows 2000 or Windows® XP
- Processor: Intel Pentium III or better (above 500HZ) - Preferred: 2.5GZ.
- RAM: 256MB - Preferred: 512MB or better
- Hard Disk 10 GB or better with 500 MB of free space
- Pointing Device: Mouse or other Windows-compatible pointing device
- Floppy Disk Drive: 3.5-inch 1.44 MB Floppy disk drive
- Multimedia: CD-ROM drive
- Display: Super VGA (1024x768 pixels)
- Printer: Windows-compatible laser or ink jet printer
- Internet: Dial up OK for uploads but slow for download installation – Preferred: DSL or Cable
- Browser: IE5 or better – Preferred: IE6

17. Control of Asphaltic Concrete Mixtures

a. Designate a Level II QCT Manager to be responsible for the daily quality control operations within his/her organization and held accountable for the action of all assigned QCTs as specified in contract. The Quality Control Manager will be responsible of ensuring that Quality Control Technicians do not simultaneously perform QCT and Plant Operator Duties.

b. The designated Level II - QCT manager will be responsible to control the Asphaltic Concrete mixtures produced for GDOT Projects. The mixture control tolerances from an approved Job Mix Formula are written in Section 828 and mixture acceptance tolerances are as written in Section 400 or Section 410 of the governing GDOT Specifications for the respective Project.

References: GSP 21 **(Sampling Procedures for Contractors)**
GDTs **(Sampling and Testing Manual or Study Guide)**
Section 828 **(Hot Mix Asphaltic Concrete Mixtures)**
Section 400 **(Hot Mix Asphaltic Concrete Construction)**